0170
100%

#4

OIPE

RAW SEQUENCE LISTING
PATENT APPLICATION: US/10/081,872

DATE: 10/07/2002
TIME: 16:57:42

Input Set : A:\09010-108001.TXT
Output Set: N:\CRF4\10072002\J081872.raw

<110> APPLICANT: Callen, Walter
Richardson, Toby
Frey, Gerhard
Short, Jay M.
Mathur, Eric J.
Gray, Kevin A.
Kerovuo, Janne S.
Slupska, Malgorzata
<120> TITLE OF INVENTION: ENZYMES HAVING ALPHA AMYLASE ACTIVITY
AND METHODS OF USE THEREOF
<130> FILE REFERENCE: 09010-108001
<140> CURRENT APPLICATION NUMBER: US 10/081,872
<141> CURRENT FILING DATE: 2002-02-21
<150> PRIOR APPLICATION NUMBER: US 60/270,495
<151> PRIOR FILING DATE: 2001-02-21
<150> PRIOR APPLICATION NUMBER: US 60/270,496
<151> PRIOR FILING DATE: 2001-02-21
<150> PRIOR APPLICATION NUMBER: US 60/291,122
<151> PRIOR FILING DATE: 2001-05-14
<160> NUMBER OF SEQ ID NOS: 321
<170> SOFTWARE: FastSEQ for Windows Version 4.0
<210> SEQ ID NO: 1
<211> LENGTH: 1311
<212> TYPE: DNA
<213> ORGANISM: Artificial Sequence
<220> FEATURE:
<223> OTHER INFORMATION: synthetically generated oligonucleotide
<400> SEQUENCE: 1

atggcaaagt attccgagct cgaagagggc gggctcataa tgcaggcctt ctactgggac 60
gtccccatgg gaggaatctg gtgggacacg atagcccaga agatacccga ctgggcaagc 120
gccgggattt cggcgatatg gattcccccg gcgagcaagg gcatgggcgg cgcctattcg 180
atgggctacg acccctacga cttctttgac ctcggtgagt acgaccagaa gggaacggta 240
gagacgcgct ttggctccaa gcaggagctc gtgaacatga taaacaccgc ccacgcctat 300
ggcatgaagg taatagccga tatagtcatc aaccaccgcg ccggcggtga cctggagtgg 360
aacccttcg tgaacgacta tacctggacc gacttctcaa aggtcgcgtc gggtaaatac 420
acggccaact acctcgactt ccacccgaac gagctccatg cgggcgattc cggaacattt 480
ggaggctatc ccgacatatg ccacgacaag agctgggacc agtactggct ctgggccagc 540
caggagagct acgcggcata tctcaggagc atcggcatcg atgcctggcg cttcgactac 600
gtcaagggct acggagcgtg ggtcgtcaag gactggctgg actggtgggg aggctgggcc 660
gtcggggagt actgggacac aaacgttgat gcactgctca actgggccta ctcgagcgat 720
gcaaaagtct tcgacttccc gctctactac aagatggacg cggcctttga caacaagaac 780
attcccgcac tcgtcgaggc cctcaagaac gggggcacag tcgtcagccg cgacccgttt 840
aaggccgtaa ccttcgttgc aaaccacgac accgatataa tctggaacaa gtatccagcc 900

RAW SEQUENCE LISTING
PATENT APPLICATION: US/10/081,872

DATE: 10/07/2002
TIME: 16:57:42

Input Set : A:\09010-108001.TXT
Output Set: N:\CRF4\10072002\J081872.raw

```
tacgcgttca tcctcaccta cgagggccag ccgacaatat tctaccgcga ctacgaggag     960
tggctcaaca aggataagct caagaacctc atctggatac atgacaacct cgccggagga    1020
agcactgaca tcgtttacta cgacaacgac gagctgatat tcgtgagaaa cggctacgga    1080
agcaagccgg gactgataac atacatcaac ctcgcctcaa gcaaagccgg aaggtgggtt    1140
tacgttccga agttcgcagg ctcgtgcata cacgagtaca ccggcaatct cggcggctgg    1200
gtggacaagt gggtggactc aagcggctgg gtctacctcg aggctcctgc ccacgacccg    1260
gccaacggcc agtacggcta ctccgtctgg agctactgcg gtgttgggtg a             1311

<210> SEQ ID NO: 2
<211> LENGTH: 436
<212> TYPE: PRT
<213> ORGANISM: Artificial Sequence
<220> FEATURE:
<223> OTHER INFORMATION: synthetically generated polypeptide
<400> SEQUENCE: 2
Met Ala Lys Tyr Ser Glu Leu Glu Glu Gly Gly Leu Ile Met Gln Ala
 1               5                  10                  15
Phe Tyr Trp Asp Val Pro Met Gly Gly Ile Trp Trp Asp Thr Ile Ala
            20                  25                  30
Gln Lys Ile Pro Asp Trp Ala Ser Ala Gly Ile Ser Ala Ile Trp Ile
        35                  40                  45
Pro Pro Ala Ser Lys Gly Met Gly Gly Ala Tyr Ser Met Gly Tyr Asp
    50                  55                  60
Pro Tyr Asp Phe Phe Asp Leu Gly Glu Tyr Asp Gln Lys Gly Thr Val
65                  70                  75                  80
Glu Thr Arg Phe Gly Ser Lys Gln Glu Leu Val Asn Met Ile Asn Thr
                85                  90                  95
Ala His Ala Tyr Gly Met Lys Val Ile Ala Asp Ile Val Ile Asn His
            100                 105                 110
Arg Ala Gly Gly Asp Leu Glu Trp Asn Pro Phe Val Asn Asp Tyr Thr
        115                 120                 125
Trp Thr Asp Phe Ser Lys Val Ala Ser Gly Lys Tyr Thr Ala Asn Tyr
    130                 135                 140
Leu Asp Phe His Pro Asn Glu Leu His Ala Gly Asp Ser Gly Thr Phe
145                 150                 155                 160
Gly Gly Tyr Pro Asp Ile Cys His Asp Lys Ser Trp Asp Gln Tyr Trp
                165                 170                 175
Leu Trp Ala Ser Gln Glu Ser Tyr Ala Ala Tyr Leu Arg Ser Ile Gly
            180                 185                 190
Ile Asp Ala Trp Arg Phe Asp Tyr Val Lys Gly Tyr Gly Ala Trp Val
        195                 200                 205
Val Lys Asp Trp Leu Asp Trp Trp Gly Gly Trp Ala Val Gly Glu Tyr
    210                 215                 220
Trp Asp Thr Asn Val Asp Ala Leu Leu Asn Trp Ala Tyr Ser Ser Asp
225                 230                 235                 240
Ala Lys Val Phe Asp Phe Pro Leu Tyr Tyr Lys Met Asp Ala Ala Phe
                245                 250                 255
Asp Asn Lys Asn Ile Pro Ala Leu Val Glu Ala Leu Lys Asn Gly Gly
            260                 265                 270
Thr Val Val Ser Arg Asp Pro Phe Lys Ala Val Thr Phe Val Ala Asn
```

RAW SEQUENCE LISTING
PATENT APPLICATION: US/10/081,872

DATE: 10/07/2002
TIME: 16:57:42

Input Set : A:\09010-108001.TXT
Output Set: N:\CRF4\10072002\J081872.raw

```
110         275                 280                 285
111 His Asp Thr Asp Ile Ile Trp Asn Lys Tyr Pro Ala Tyr Ala Phe Ile
112     290                 295                 300
113 Leu Thr Tyr Glu Gly Gln Pro Thr Ile Phe Tyr Arg Asp Tyr Glu Glu
114 305                 310                 315                 320
115 Trp Leu Asn Lys Asp Lys Leu Lys Asn Leu Ile Trp Ile His Asp Asn
116                 325                 330                 335
117 Leu Ala Gly Gly Ser Thr Asp Ile Val Tyr Tyr Asp Asn Asp Glu Leu
118             340                 345                 350
119 Ile Phe Val Arg Asn Gly Tyr Gly Ser Lys Pro Gly Leu Ile Thr Tyr
120         355                 360                 365
121 Ile Asn Leu Ala Ser Ser Lys Ala Gly Arg Trp Val Tyr Val Pro Lys
122     370                 375                 380
123 Phe Ala Gly Ser Cys Ile His Glu Tyr Thr Gly Asn Leu Gly Gly Trp
124 385                 390                 395                 400
125 Val Asp Lys Trp Val Asp Ser Ser Gly Trp Val Tyr Leu Glu Ala Pro
126                 405                 410                 415
127 Ala His Asp Pro Ala Asn Gly Gln Tyr Gly Tyr Ser Val Trp Ser Tyr
128             420                 425                 430
129 Cys Gly Val Gly
130         435
132 <210> SEQ ID NO: 3
133 <211> LENGTH: 1311
134 <212> TYPE: DNA
135 <213> ORGANISM: Artificial Sequence
137 <220> FEATURE:
138 <223> OTHER INFORMATION: synthetically generated oligonucleotide
140 <400> SEQUENCE: 3
141 atggccaagt acctggagct cgaagagggc gggctcataa tgcaggcctt ctactgggac      60
142 gtccccatgg gaggaatctg gtgggacacg atagcccaga agatacccga ctgggcaagc     120
143 gccgggattt cggcgatatg gattcccccg gcgagcaagg gcatgggcgg cgcctattcg     180
144 atgggctacg acccctacga cttctttgac ctcggtgagt acgaccagaa gggaacggta     240
145 gagacgcgct ttggctccaa gcaggagctc gtgaacatga taaacaccgc ccacgcctac     300
146 ggcatcaagg tcatcgcaga catagtaatc aaccaccgcg ccggaggaga ccttgagtgg     360
147 aacccccttcg tcaatgacta cacctggacg gacttctcga aggtcgcttc cggcaagtac     420
148 acggccaatt acctcgactt ccacccgaac gagctccatg cgggcgattc cggaacattt     480
149 ggaggctatc ccgacatatg ccacgacaag agctgggacc agtactggct ctgggccagc     540
150 caggagagct acgcggcata tctcaggagc atcggcatcg atgcctggcg cttcgactac     600
151 gtcaagggct atgctccctg ggtcgtcaag gactggctga actggtgggg aggctgggcg     660
152 gttggagagt actgggacac caacgtcgac gctgttctca actgggcata ctcgagcggt     720
153 gccaaggtct ttgacttcgc cctctactac aagatggatg aggcctttga caacaaaaac     780
154 attccagcgc tcgtctctgc ccttcagaac ggccagactg ttgtctcccg cgacccgttc     840
155 aaggccgtaa cctttgtagc aaaccacgac accgatataa tctggaacaa gtatccagcc     900
156 tacgcgttca tcctcaccta cgagggccag ccgacaatat tctaccgcga ctacgaggag     960
157 tggctcaaca aggataagct caagaacctc atctggatac atgacaacct cgccggagga    1020
158 agcactgaca tcgtttacta cgacaacgac gagctgatat tcgtgagaaa cggctacgga    1080
159 agcaagccgg gactgataac atacatcaac ctcgcctcaa gcgaagccgg aaggtgggtc    1140
160 tacgttccga agttcgcggg agcgtgcatc cacgagtaca ccggcaacct cggcggctgg    1200
161 gtggacaagt gggtggactc aagcgggtgg gtgtacctcg aggcccctgc ccacgacccg    1260
```

RAW SEQUENCE LISTING
PATENT APPLICATION: US/10/081,872

DATE: 10/07/2002
TIME: 16:57:42

Input Set : A:\09010-108001.TXT
Output Set: N:\CRF4\10072002\J081872.raw

gccaacggct attacggcta ctccgtctgg agctattgcg gtgttgggtg a 1311

<210> SEQ ID NO: 4
<211> LENGTH: 436
<212> TYPE: PRT
<213> ORGANISM: Artificial Sequence
<220> FEATURE:
<223> OTHER INFORMATION: synthetically generated polypeptide
<400> SEQUENCE: 4

Met Ala Lys Tyr Leu Glu Leu Glu Glu Gly Gly Leu Ile Met Gln Ala
 1 5 10 15
Phe Tyr Trp Asp Val Pro Met Gly Gly Ile Trp Trp Asp Thr Ile Ala
 20 25 30
Gln Lys Ile Pro Asp Trp Ala Ser Ala Gly Ile Ser Ala Ile Trp Ile
 35 40 45
Pro Pro Ala Ser Lys Gly Met Gly Gly Ala Tyr Ser Met Gly Tyr Asp
 50 55 60
Pro Tyr Asp Phe Phe Asp Leu Gly Glu Tyr Asp Gln Lys Gly Thr Val
65 70 75 80
Glu Thr Arg Phe Gly Ser Lys Gln Glu Leu Val Asn Met Ile Asn Thr
 85 90 95
Ala His Ala Tyr Gly Ile Lys Val Ile Ala Asp Ile Val Ile Asn His
 100 105 110
Arg Ala Gly Gly Asp Leu Glu Trp Asn Pro Phe Val Asn Asp Tyr Thr
 115 120 125
Trp Thr Asp Phe Ser Lys Val Ala Ser Gly Lys Tyr Thr Ala Asn Tyr
 130 135 140
Leu Asp Phe His Pro Asn Glu Leu His Ala Gly Asp Ser Gly Thr Phe
145 150 155 160
Gly Gly Tyr Pro Asp Ile Cys His Asp Lys Ser Trp Asp Gln Tyr Trp
 165 170 175
Leu Trp Ala Ser Gln Glu Ser Tyr Ala Ala Tyr Leu Arg Ser Ile Gly
 180 185 190
Ile Asp Ala Trp Arg Phe Asp Tyr Val Lys Gly Tyr Ala Pro Trp Val
 195 200 205
Val Lys Asp Trp Leu Asn Trp Trp Gly Gly Trp Ala Val Gly Glu Tyr
 210 215 220
Trp Asp Thr Asn Val Asp Ala Val Leu Asn Trp Ala Tyr Ser Ser Gly
225 230 235 240
Ala Lys Val Phe Asp Phe Ala Leu Tyr Tyr Lys Met Asp Glu Ala Phe
 245 250 255
Asp Asn Lys Asn Ile Pro Ala Leu Val Ser Ala Leu Gln Asn Gly Gln
 260 265 270
Thr Val Val Ser Arg Asp Pro Phe Lys Ala Val Thr Phe Val Ala Asn
 275 280 285
His Asp Thr Asp Ile Ile Trp Asn Lys Tyr Pro Ala Tyr Ala Phe Ile
 290 295 300
Leu Thr Tyr Glu Gly Gln Pro Thr Ile Phe Tyr Arg Asp Tyr Glu Glu
305 310 315 320
Trp Leu Asn Lys Asp Lys Leu Lys Asn Leu Ile Trp Ile His Asp Asn

RAW SEQUENCE LISTING
PATENT APPLICATION: US/10/081,872

DATE: 10/07/2002
TIME: 16:57:42

Input Set : A:\09010-108001.TXT
Output Set: N:\CRF4\10072002\J081872.raw

```
214                 325                 330                 335
215 Leu Ala Gly Gly Ser Thr Asp Ile Val Tyr Tyr Asp Asn Asp Glu Leu
216             340                 345                 350
217 Ile Phe Val Arg Asn Gly Tyr Gly Ser Lys Pro Gly Leu Ile Thr Tyr
218         355                 360                 365
219 Ile Asn Leu Ala Ser Ser Glu Ala Gly Arg Trp Val Tyr Val Pro Lys
220     370                 375                 380
221 Phe Ala Gly Ala Cys Ile His Glu Tyr Thr Gly Asn Leu Gly Gly Trp
222 385                 390                 395                 400
223 Val Asp Lys Trp Val Asp Ser Ser Gly Trp Val Tyr Leu Glu Ala Pro
224                 405                 410                 415
225 Ala His Asp Pro Ala Asn Gly Tyr Tyr Gly Tyr Ser Val Trp Ser Tyr
226             420                 425                 430
227 Cys Gly Val Gly
228         435
230 <210> SEQ ID NO: 5
231 <211> LENGTH: 1311
232 <212> TYPE: DNA
233 <213> ORGANISM: Artificial Sequence
235 <220> FEATURE:
236 <223> OTHER INFORMATION: synthetically generated oligonucleotide
238 <400> SEQUENCE: 5
239 atggccaagt actccgagct ggaagagggc ggcgttataa tgcaggcctt ctactgggac      60
240 gtcccaggtg gaggaatctg gtgggacacc atcaggagca agataccgga gtggtacgag     120
241 gcgggaatat ccgccatttg gattcccccg gcaagcaagg gcatgggcgg cgcctattcg     180
242 atgggctacg acccctacga cttctttgac ctcggtgagt acgaccagaa gggaacggta     240
243 gagacgcgct ttggctccaa gcaggagctc gtgaacatga taaacaccgc ccacgcctat     300
244 ggcatgaagg taatagccga tatagtcatc aaccaccgcg ccggcggtga cctggagtgg     360
245 aacccccttcg tgaacgacta tacctggacc gacttctcaa aggtcgcgtc gggtaaatac     420
246 acggccaact acctcgactt ccacccgaac gagctccatg cgggcgattc cggaacattt     480
247 ggaggctatc ccgacatatg ccacgacaag agctgggacc agtactggct ctgggccagc     540
248 caggagagct acgcggcata tctcaggagc atcggcatcg atgcctggcg cttcgactac     600
249 gtcaagggct atgctccctg ggtcgtcaag gactggctga actggtgggg aggctgggcg     660
250 gttggagagt actgggacac caacgtcgac gctgttctca actgggcata ctcgagcggt     720
251 gccaaggtct ttgacttcgc cctctactac aagatggatg aggcctttga caacaaaaac     780
252 attccagcgc tcgtctctgc ccttcagaac ggccagactg ttgtctcccg cgacccgttc     840
253 aaggccgtaa cctttgtagc aaaccacgac accgatataa tctggaacaa gtaccttgct     900
254 tatgctttca tcctcaccta cgaaggccag cccgtcatat tctaccgcga ccacgaggag     960
255 tggctcaaca aggacaggtt gaacaacctc atatggatac acgaccacct cgcaggtgga    1020
256 agcaccgaca tagtctacta cgataacgat gaactcatct tcgtcaggaa cggctacggg    1080
257 gacaagccgg ggcttataac ctacatcaac ctaggctcga gcaaggccgg aaggtgggtt    1140
258 tatgtgccga agttcgcggg cgcgtgcatc cacgagtata ctggtaacct cggaggctgg    1200
259 gtagacaagt acgtctactc aagcggctgg gtctatctcg aagctccagc ttacgaccct    1260
260 gccaacgggc agtatggcta ctccgtgtgg agctactgcg gggtgggctg a             1311
262 <210> SEQ ID NO: 6
263 <211> LENGTH: 436
264 <212> TYPE: PRT
265 <213> ORGANISM: Artificial Sequence
267 <220> FEATURE:
```

VERIFICATION SUMMARY DATE: 10/07/2002
PATENT APPLICATION: **US/10/081,872** TIME: 16:57:43

Input Set : **A:\09010-108001.TXT**
Output Set: **N:\CRF4\10072002\J081872.raw**